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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,302	04/01/2004	D. Amnon Silverstein	200309882-1	6116

22879 7590 03/20/2009
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ART UNIT	**PAPER NUMBER**
2624	

NOTIFICATION DATE	DELIVERY MODE
03/20/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/814,302	SILVERSTEIN ET AL.
	Examiner	**Art Unit**
	Mia M. Thomas	2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-7,9-31 and 33-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-7,9-31 and 33-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 November 2008* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This is Office Action is responsive to applicant's remarks received on 21 November 2008. Applicants hereby add new claims 42-43 which are supported at least by Figs. 4-6 and the associated teachings of the specification. Claims 1-43 are now pending in the instant application and a complete response follows herewith. *Note: The Examiner believes that applicant intended to state that claims 1-3, 5-7, 9-31, 33-43 are now pending since as currently pending, claims 4, 8 and 32 are canceled.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1-3,5-7,9-20 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent[1] and recent Federal Circuit decisions[2] indicate that a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim recites a series of steps or acts to be performed, the claim neither transforms underlying subject matter nor is positively tied to another statutory category that accomplishes the claimed method steps, and therefore does not qualify as a statutory process.

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[1] *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

[2] *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

The Applicant has provided no explicit and deliberate definitions of "receiving", “analyzing” or "responding" to limit the steps to blend images into a single image as claimed and independent claims 1 and 16.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3,5-7,9-20, 37-40, 42 and 33-36, 43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding the term “differences” the Examiner is unclear what exactly the applicant is referring to. The term “difference/differences” by definition, according to Merriam Webster online (www.m-w.com), reads as “the degree or amount by which things differ in quantity or measure”. This definition could refer to a remainder or a minor change in detail. The term "differences" is considered vague and indefinite since the applicant has not defined how to determine that a "difference" exists between "two overlapping strips". **Appropriate clarification and correction is required for proper claim analysis.**

Claim Objections - 37 CFR 1.75(a)

6. The following is a quotation of 37 CFR 1.75(a):

> The specification must conclude with a claim particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention or discovery.

7. Claims 1-3,5-7,9-25, 33-36, 37-41, 42, 43 are objected to under 37 CFR 1.75(a) as failing to particularly point out and distinctly claim the subject matter which the applicant regards as his invention or discovery.

Regarding claims 1, 16, 21 and 33 the term “the minimized line” at line 10 of Claim 1 for example lacks an antecedent basis. However, it appears from the context of the claim when read in light of the specification that “the minimized line” is in fact referring to the “line” first introduced at line 8 of the claim; and this will be assumed for examination purposes. Similarly, at line 10 of claim 16; “the minimized line” at line 12 of Claim 21; and “the minimized line” at line 11 of Claim 33, lacks an antecedent basis. Appropriate correction and clarification is required for proper claim analysis.

Regarding the term “a single image” at line 10 of Claim 1; “a single image” at line 10 of Claim 16; “a single image” at line 12 of Claim 21 and “a single image” at line 11 of Claim 33, lacks an antecedent basis. Appropriate correction and clarification is required for proper claim analysis.

Regarding the term “the overlapping two strips” at line 7 of Claim 1; “the overlapping two strips” at line 5 of Claim 16; “the overlapping two strips” at line 9 of Claim 21; “the overlapping two strips” at line 8 of Claim 33 lacks an antecedent basis. Appropriate correction and clarification is required for proper claim analysis. Similarly, the term “the selected overlapping strips” at line 6, claim 16; lacks an antecedent basis.

Regarding the term "the blending line" at line 12, claim 16, lacks an antecedent basis. Appropriate correction and clarification is required for proper claim analysis.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1, 2, 3, 5, 6, 33, 34, 37, 38, 39, 42, 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1).

Regarding Claim 1: (Previously Presented-As best understood by the Examiner) Mai teaches a method for blending images into a single image (Refer to abstract; "The present invention provides a system for mosaicing multiple input images, captured by one or more remote sensors, into a seamless mosaic of an area of interest. Each set of input images captured by the remote sensors within a capture interval are ortho-rectified and mosaiced together into a composite image. Successive composite images, along a given flight path, are then mosaiced together to form a strip. Adjacent strips are then mosaiced together to form a final image of the area of interest." at abstract); comprising:

selecting two images having overlapping content ("More specifically, the present invention provides a system for mosaicing two overlapping digital input images together. One input image, comprising a number of pixels having certain intensity, is identified as the reference

image. A second input image, also comprising a number of pixels having certain intensity, overlaps the reference image in an overlap area." at paragraph [0008]);

determining differences between the overlapping two strips ("The present invention also provides a method for rendering multiple, partially-overlapping input image strips of a target terrain into a seamless image mosaic of the target terrain that includes normalizing the intensity of each input image to a desired mean and standard deviation. A reference image and a secondary image, having a partially overlapping area and a common boundary area are provided. A segmented seam line between the reference and secondary image strips, that minimizes perspective imaging effects of elevated features in those images, is established. The boundary area is divided into segments corresponding to the segments of the seam line. A balancing correlation matrix is computed for each such segment." at paragraph [0013, 0060-0068]);

determining a line through the overlapping strips where the differences between the overlapping strips are minimized (Refer to paragraph [0012]; specifically, "In addition, the present invention also provides a method of establishing a seam line between adjacent image strips that minimizes perspective imaging effects of elevated features in the image strips. An initial seam line between the image strips is selected.");

and blending the two images together along the minimized line to create a single image ("The present invention provides a versatile system for efficiently and reliably stitching together images, collected from high-resolution digital imaging sensors, into a seamless, high quality, wide FOV mosaic image." at paragraph [0007]; "The initial seam line is divided into small segments. The position of an elevated feature in a particular segment is determined; and the

route of the seam line in that segment is then altered based on the position of the elevated feature." at paragraph [0012]; "a versatile system for efficiently and reliably stitching together images, collected from high-resolution digital imaging sensors, into a seamless, high quality, mosaic image covering a wide FOV. The mosaicing processes of the present invention efficiently stitch (or mosaic) thousands of small, digital sub-images into a single, high-quality composite image." at paragraph [0029]);

Kang teaches dividing the two images into strips ("This multiperspective plane sweep approach uses virtual camera positions to compute depth maps for strips of overlapping pixels in adjacent images. These strips, which are at least one pixel in width, are perpendicular to camera motion." at paragraph [0011])

selecting a strip in each of the two images where the two images overlap each other (Refer to Figure 3b and 4b for example)

Mai and Kang are combinable because they are in the same field of image transformations specifically combining image portions.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai and Kang. All of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of Mai and Kang would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

The suggestion/motivation for combining the teachings of Mai and Kang would have been "…because the multiperspective plane sweep approach described herein is both computationally efficient, and applicable to both the case of limited overlap between the images used for creating the image mosaics, and to the case of extensive or increased image overlap." at paragraph [0051], Kang.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai and Kang to obtain the specified claimed elements of Claim 1.

Regarding Claim 33: Claim 33 discloses claimed subject matter that equally resembles the claimed method of Claim 1. Claim 33 is rejected for the same reasons, motivation and rationale as rejected above at Claim 1. Claim 33 is the computer readable medium encoded with software that resembles the claimed method of Claim 1. Mai teaches ("The modules, algorithms and processes described above can be implemented in a number technologies and configurations. Embodiments of the present invention may comprise functional instances of software or hardware, or combinations thereof. Furthermore, the modules and processes of the present invention may be combined together in a single functional instance (e.g., one software program), or may comprise operatively associated separate functional devices (e.g., multiple networked processor/memory blocks). All such implementations are comprehended by the present invention." at paragraph [0099]).

Regarding Claim 34: (Original) Kang teaches the software wherein the selected images differ from each other based on at least recording time, camera location, camera setting, lighting, shadows, and/or background (Refer to paragraph [0015]).

Regarding Claim 37: (Previously Presented) Kang teaches wherein the selecting comprises selecting the strips of the two images which provide reduced error between the selected overlapping two strips compared with non-selected strips of the two images (Refer to paragraph [0007]).

Regarding Claim 38: (Previously Presented) Kang teaches the determining differences comprises determining differences between image data content of the overlapping two strips (Refer to paragraph [0057]).

Regarding Claim 39: (Previously Presented) Kang teaches the determining differences between image data content comprises determining differences between the image data content of one pixel of one of the overlapping two strips and one pixel of another of the overlapping two strips and wherein the one pixels of the one and the another of the overlapping two strips both correspond to the same subject present in the two images (Refer to paragraph [0050]).

Regarding Claim 42: (New) Kang teaches the selecting a strip in each of the two images comprises selecting the strips in the two images which comprise the same content of a scene present in the two images ("The use of multiple cameras provides the capability to capture

multiple views of an image simultaneously or sequentially, to capture three-dimensional or depth images, or to capture panoramic images of a scene." at paragraph [0045]).

Regarding Claim 43: (New) Kang teaches selecting the strips in the two images which comprise the same content of a scene present in the two images ("The use of multiple cameras provides the capability to capture multiple views of an image simultaneously or sequentially, to capture three-dimensional or depth images, or to capture panoramic images of a scene." at paragraph [0045]).

Regarding Claim 2: (Original) Kang teaches the selected images belong to a set of two or more images comprising a scene ("In general, image mosaics are a combination of two or more overlapping images that serve to present an overall view of a scene from perspectives other than those of the individual images used to generate the mosaic." at paragraph [0004]).

Regarding Claim 3: (Original) Kang teaches the selected images differ from each other based on at least recording time, camera location, camera setting, lighting, shadows, and/or background (Refer to paragraph [0015]).

Regarding Claim 5:(Original) Kang teaches the selected images are divided along a common plane ("This multiperspective plane sweep approach uses virtual camera positions to compute depth maps for strips of overlapping pixels in adjacent images. These strips, which are at least one pixel in width, are perpendicular to camera motion." at paragraph [0011]);

Regarding Claim 6: (Original) Kang teaches the selected images are divided into strips along one of a vertical plane or a horizontal plane ("This multiperspective plane sweep approach uses virtual camera positions to compute depth maps for strips of overlapping pixels in adjacent images. These strips, which are at least one pixel in width, are perpendicular to camera motion. For horizontal camera motion, these strips correspond to pixel columns." at paragraph [0011]).

10. Claims 9, 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and further in view of Pham et al. "Color Correction for an Image Sequence", 1995, IEEE, pages 38-42.

Regarding Claim 9: (Original) Mai in combination with Kang teaches all the claimed elements as rejected above. Mai in combination with Kang does not specifically teach calculating a difference value for each pixel pair between the two overlapping strips.

Pham teaches calculating a squared color difference value for each pixel pair between the overlapping strips (Refer to page 38; "This color correction technique constructs a mapping from the registered overlapping regions of two adjacent images in an image sequence. It uses multiple regression to minimize color differences. Also see right column, "Mapping Construction", paragraph 2);

Kang teaches converting the squared color difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips (Refer to paragraph [0012],[0051]); sorting the gray scale pixels from largest to smallest difference value; for each sorted gray scale

pixel, mapping the gray scale pixel to one of two regions within the overlapping strip according to the adjacency of the gray scale pixel to the one of the two regions; determining a cut line between the two regions (Refer to paragraph [0051]); cutting each selected image along the cut line within the overlapping strip of each selected image (Refer to Figure 2, numeral 250); and combining the two cut selected images along the cut line to form the single image (Refer to Figure 6, numeral 660, paragraph [0098]).

Mai, Kang and Pham are combinable because they are in the same field of image transformations specifically combining image portions.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Pham. All of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of Mai, Kang and Pham would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

The suggestion/motivation for doing so would have been "…because the multiperspective plane sweep approach described herein is both computationally efficient, and applicable to both the case of limited overlap between the images used for creating the image mosaics, and to the case of extensive or increased image overlap." at paragraph [0051], Kang.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Pham to obtain all the specified claimed elements of Claim 9.

Regarding Claim 36: (Original) Mai in combination with Kang teaches all the claimed elements as rejected above. Mai in combination with Kang does not specifically teach calculating a difference value for each pixel pair between the two overlapping strips.

Pham teaches calculating a difference value for each pixel pair between the two overlapping strips (Refer to page 38; "This color correction technique constructs a mapping from the registered overlapping regions of two adjacent images in an image sequence. It uses multiple regression to minimize color differences. Also see right column, "Mapping Construction", paragraph 2);

Kang teaches converting the calculated difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips (Refer to paragraph [0012],[0051]); sorting the gray scale pixels from largest to smallest difference value; for each sorted gray scale pixel, mapping the gray scale pixel to a first region or a second region within the overlapping strip according to the adjacency of the gray scale pixel to the first region or the second region (Refer to paragraph [0051]); determining a cut line within the overlapping strips between the first mapped region and the second mapped region(Refer to Figure 2, numeral 250); cutting each selected image along the cut line of the overlapping strip of each selected image (Refer to Figure 2, numeral 250); and combining the two cut selected images along the cut line to form the single image (Refer to Figure 6, numeral 660, paragraph [0098]).

Mai, Kang and Pham are combinable because they are in the same field of image transformations specifically combining image portions.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Pham. All of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of Mai, Kang and Pham would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

The suggestion/motivation for doing so would have been "...because the multiperspective plane sweep approach described herein is both computationally efficient, and applicable to both the case of limited overlap between the images used for creating the image mosaics, and to the case of extensive or increased image overlap." at paragraph [0051], Kang.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Pham to obtain all the specified claimed elements of Claim 36.

11. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and Pham et al. "Color Correction for an Image Sequence", 1995, IEEE, pages 38-42 and further in view of Peterson US (6,411,742 B1).

Regarding Claim 10: (Original) Mai in combination with Kang and Pham teach all the claimed elements as rejected above. Mai in combination with Kang and Pham does not specifically

teach the cut line is determined between a first region and a second region to which the pixels have been mapped.

Peterson teaches the cut line is determined between a first region and a second region to which the pixels have been mapped ("The second image is divided into the first and second section by a dividing line that is determined based on an outline of the first image…" at column 2, line 22).

Mai, Kang, Pham and Peterson are combinable because they are in the same field of image transformations, specifically, combining image portions. (See abstract and classification of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to determine a cut line between a first region and a second region to which the pixels have been mapped.

The motivation/suggestion for doing so would have been "to save processing time without altering the images and masking out portions of an image." at column 1, line 50+, Peterson.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai in combination with Kang, Pham and Peterson to obtain the specified claimed elements of Claim 10.

Regarding Claim 11: (Original) Peterson teaches the cut line corresponds to the line of best match between the overlapping strips ("For example, a seam 62 is created…where the two

images 18c and 18d join each other…and create a near seamless panoramic image 26 (Figure 2b) ", at column 4, line 42).

12. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and Pham et al. "Color Correction for an Image Sequence", 1995, IEEE, pages 38-42 and further in view of Xiong (US 5,549,651 B2).

Regarding Claim 12: (Original) Mai in combination with Kang and Pham teach all the claimed elements as rejected above. Mai in combination with Kang and Pham does not specifically teach one of the cut images is warped along the cut line to improve the fit between the two cut images along the cut line.

Xiong teaches at least one of the cut images is warped along the cut line to improve the fit between the two cut images along the cut line ("The present invention is designed to calibrate and align all such 2D rectilinear images with respect to one another and globally, blend the images where they overlap, and construct a reconstructed and relatively error free 3D panorama image, shown conceptually in 2D form as FIG. 1(b), for any arbitrary geometry." at column 3, line 47).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to calculate at least one of the cut images as to warp along the cut line to improve the fit between the two cut images along the cut line.

Mai, Kang, Pham and Xiong are combinable because they are in the same field of creating high quality virtual panoramas.

The suggestion/motivation for doing so would have been to "yield dramatic improvements during the mathematical, authorization processes and projection cycles with speeds up to several order of magnitude faster than any prior system." (Abstract, Xiong).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the claimed elements of Mai, Kang, Pham and Xiong to obtain the specified claimed elements of Claim 12.

Regarding Claim 13: (Original) Xiong teaches a Gaussian function is used to warp the at least one cut image ("The third step re-projects all images…by employing Laplacian pyramid based blending using a Gaussian blend mask…" at column 2, line 18).

13. Claims 7, 14, 15, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and further in view of Peterson US (6,411,742 B1).

Regarding Claim 7: (Original) Mai in combination with Kang teach all the claimed elements as rejected above. Mai in combination with Kang does not specifically teach the two overlapping strips are selected according to a mean squared difference algorithm.

Peterson teaches the two overlapping strips are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two

selected strips is minimized ("For example, the top left corner of the doorway is horizontally displaced from the bottom left corner of the image by a distance x0 in the first images 18a, while it is displaced by a distance x1 in the second image 18a. Consequently the second image is displaced to the left of the first image by a distance (d-left) given by the mathematical equation: d-left = x0-x1." at column 4, line 12).

Mai, Kang and Peterson are combinable because they are in the same field of image transformations, specifically, combining image portions.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to utilize a mean squared difference algorithm for user manipulation such that the sum of the mean squared difference values between the two strips is minimized.

The motivation/suggestion for doing so would have been "to save processing time without altering the images and masking out portions of an image." at column 1, line 50+, Peterson.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai in combination with Kang and Peterson to obtain the specified claimed elements of Claim 7.

Regarding Claim 14 (Original)**:** Peterson teaches the blending of images is performed iteratively ("Referring to Figure 2B, image stitching software 14, blends the images 18a-18d so to generate a single panoramic image 26…" at column 3, line 52), with the blended single image being utilized as one of the selected two images to be blended ("If there are more images, the

stitching software 14 sets (224) the reference image to be the next image after the current image and repeats the process…" at column 5, line 48).

Regarding Claim 15: Peterson teaches the method of blending is performed iteratively (Figure 2B describes the method of blending images iteratively by blending any of images 18a-18d; "…image stitching software 14, blends the images 18a-18d so to generate a single panoramic image 26…" at column 3, line 52) until all images comprising the scene have been blended into a final single image of the scene ("Consequently, additional processing is required to blend the images into each other and create the near seamless panoramic image 26 (Figure 2B)." at column 4, line 45).

Regarding Claim 35: (Original) Mai in combination with Kang teaches all the claimed elements as rejected above. Mai in combination with Kang does not specifically teach a mean squared difference algorithm.

Peterson teaches the two overlapping strips are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two selected strips is minimized ("For example, the top left corner of the doorway is horizontally displaced from the bottom left corner of the image by a distance x0 in the first images 18a, while it is displaced by a distance x1 in the second image 18a. Consequently the second image is displaced to the left of the first image by a distance (d-left) given by the mathematical equation: d-left = x0-x1." at column 4, line 12).

Mai, Kang and Peterson are combinable because they are in the same field of image transformations, specifically, combining image portions. (See abstract and classification of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to utilize a mean squared difference algorithm for user manipulation such that the sum of the mean squared difference values between the two strips is minimized.

The motivation/suggestion for doing so would have been “to save processing time without altering the images and masking out portions of an image.” at column 1, line 50+, Peterson.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai in combination with Kang and Peterson to obtain the specified claimed elements of Claim 35.

14. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and further in view of Herman (US 6,075,905).

Regarding Claim 40: (Previously Presented-As best understood by the Examiner) Mai in combination with Kang teaches all the claimed elements as rejected above. Mai in combination with Kang does not specifically teach determining differences between the image data content comprising color space content of the overlapping two strips.

Herman teaches determining differences between the image data content comprising color space content of the overlapping two strips ("Extending the objective function to more than two overlapping images is done simply by ascribing affine transformation to all but one of the images (these transformations being with respect to the untransformed, or reference image), and then by adding the squared RGB color differences over all the pixels in all the overlap regions." at column 15, line 8+).

Mai, Kang and Herman are combinable because they are in the same field of merging images into panoramic images.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to determining differences between the image data content comprising color space content of the overlapping two strips.

The suggestion/motivation for doing so would be "to provide a practical method for obtaining high quality images, having a wide field of view, from relatively lower quality source images. This capability can have important uses in consumer and professional "photography," in which a video camera or digital camera is used to provide photographic quality prints. It can also be used to enhance the quality of displayed video." at column 3, line 65, Herman.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Herman to obtain the specified claimed elements of Claim 40.

15. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson US (6,411,742 B1) and Kang et al (US20030235344 A1).

Regarding Claim 16: (Currently Amended-As best understood by the Examiner) Peterson teaches a method for blending images into a single image (Refer to column 1, line 6)
determining a line through the selected overlapping strips where differences between the selected overlapping strips are minimized (Figure 3c; "The dividing line determiner 54 determines an outline 74 (Fig. 3c)…formed by aligning the current image 18b' and the reference image 18a…" at column 5, line 25 (e.g. Figure 3a, numeral 214 and 216));
blending the two images along the determined minimized line to create a single image (Refer to column 1, line 51);

Kang teaches dividing two images into strips along a common plane (Refer to paragraph [0011]; further at Figures 3a and 3b)–selecting a strip in each image where the two images overlap (Refer to Figure 6, numeral 600), wherein the selecting comprises selecting the overlapping strips which have reduced error between the selected overlapping strips compared with non-selected overlapping strips of the two images (Refer to Figure 6);
and warping the single image to minimize blurring along the blending line. ("Even if the camera motion is not horizontal, the images are warped or "rectified" to produce an effective horizontal camera motion." at paragraph [0011]).

Peterson and Kang are combinable because they are in the same field of merging images into panoramic images.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson and Kang since all the claimed elements were known in the prior art at the time of the invention. The combination of the claimed elements would have yielded predictable results to the skilled artisan at the time of the invention.

The suggestion/motivation for combining the teachings of Peterson and Kang would be that "better mosaicing will result if the boundaries of the strip are taken to be approximately perpendicular to the "optical flow" (local image displacement) generated by the camera motion. Examples are camera translations: sideways motion, forward motion, and a general translation; as well as camera zoom." @ paragraph [0111]. Warping also allows the user of this method to form, shape, bend and stretch the images to obtain a best match for providing a seamless match of a blended single image.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson with Kang to obtain the specified claimed elements of Claim 16.

11. Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson US (6,411,742 B1) and Kang et al (US20030235344 A1) and further in view of Xiong (US 5,549,651 B2).

Regarding Claim 17 (Previously Presented): Peterson and Kang in combination teach all the claimed elements as rejected above. Peterson and Kang in combination does not expressly teach at least one of the cut images is warped along the cut line to improve the fit between the two cut images along the cut line.

Xiong teaches the minimized line is determined by calculating mean squared difference values for pairs of pixels between the two selected overlapping image strips. ("Different combinations of overlapping areas are tried to achieve the optimal overlap between images (or, equivalently, the smallest error in the error function or pair wise objective function described herein) using the steps described herein, which generally minimizes the average squared pixel intensity (e.g., brightness and contrast) difference with respect to certain transformation parameters." at column 4, line 65).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to calculate the minimized line is determined by calculating mean squared difference values for pairs of pixels between the two selected overlapping image strips.

Peterson, Kang and Xiong are combinable because they are in the same field of creating high quality virtual panoramas. (See abstract Xiong).

The suggestion/motivation for doing so would have been to "yield dramatic improvements during the mathematical, authorization processes and projection cycles with speeds up to several order of magnitude faster than any prior system." (Abstract, Xiong).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the claimed elements of Peterson, Kang and Xiong to obtain the specified claimed elements of Claim 17.

Regarding Claim 18 (Currently Amended): Xiong teaches at least one of the images is warped where the differences between the selected overlapping strips along the blending line exceed a predetermined threshold (Where the images overlap there is potential for misalignment when constructing a 3D panorama, as indicated by blurry lines 112, for a variety of reasons, ... distortions that occur when warping a 2D image to construct a 3D image space. The present invention is designed to calibrate and align all such 2D rectilinear images with respect to one another and globally, blend the images where they overlap, and construct a reconstructed and relatively error free 3D panorama image, shown conceptually in 2D form as FIG. 1(b), for any arbitrary geometry." at column 3, line 41).

Regarding Claim 19 (Original): Xiong teaches wherein the single image is warped by application of a Gaussian function ("The Gaussian pyramid may be constructed by applying a low-pass filter to the blend mask, which dilutes the sharp edges, from linear interpolation between the black and white regions of the blend mask, or from other techniques." at column 15, line 48).

Regarding Claim 20 (Original): Xiong teaches where the Gaussian function is applied iteratively along a plurality of planes and with a plurality of magnitudes of warp to determine the best fit between the images. ("The local pair wise registration module 222 iterates until the entire Gaussian pyramid is traversed…and working out the finest level resolution, as indicated in decision box 324." at column 5, line 27).

17. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Peterson US (6,411,742 B1) in combination with Peleg (US 2003-0076406 A1) and Pham et al. “Color Correction for an Image Sequence”, pages 38-42.

Regarding Claim 21 (Currently Amended): Peterson teaches computer-based system for blending images into a single image (Refer to Figure 1, numeral 10),

determine a line through the overlapping strips where a sum of the pixel difference values between the overlapping strips is minimized (Refer to column 5,line 17+; also refer to Figure 3c, 3c-1 by way of numeral 54); and blend the two images together along the minimized line to create a single image (Refer to column 1, line 51).

Peleg teaches divide two images having overlapping content into strips along a common plane wherein each strip is a long and narrow piece of the image having one dimension which is greater than another dimension of the respective strip (Refer to Figure 6, numerals 601-604); select a strip of uniform width in each of the two images where the two images overlap each other (Refer to paragraph [0140]);

Peterson in combination with Peleg does not specifically teach determining pixel difference values between the overlapping two strips.

Pham teaches determine pixel difference values between the overlapping two strips (Refer to page 38, Section “Mapping Construction”; “We wish to find a mapping that will convert the color value of each of the pixels in A’ to the corresponding pixel color value in B’.”)

Peterson, Peleg and Pham are combinable because they are in the same field of merging images into panoramic images.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to determine pixel difference values between the overlapping two strips.
The suggestion/motivation for doing so would be that to create an environment that eases "multiple regression steps to find the relationship between the registered overlapping regions of two adjacent images in a sequence." see page 38, right column, paragraph 2, Pham.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson, Peleg and Pham to obtain the specified claimed elements of Claim 21.

Regarding Claim 22: (Original) Peterson teaches wherein the two overlapping strips are selected according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized ("For example, the top left corner of the doorway is horizontally displaced from the bottom left corner of the image by a distance x0 in the first images 18a, while it is displaced by a distance x1 in the second image 18a. Consequently the second image is displaced to the left of the first image by a distance (d-left) given by the mathematical equation: d-left = x0-x1." at column 4, line 12).

18. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson US (6,411,742 B1) in combination with Peleg (US 2003-0076406 A1) and Pham et al. "Color Correction for an Image Sequence", 1995, IEEE, pages 38-42, and further in view of Kang et al (US 20030235344 A1).

Regarding Claim 23: (Original) Peterson in combination with Peleg and Pham teaches all the claimed elements as rejected above. Peterson in combination with Peleg and Pham does not specifically teach converting the squared color difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips sorting the gray scale pixels from largest to smallest difference value; for each sorted gray scale pixel, mapping the gray scale pixel to one of two regions within the overlapping strip according to the adjacency of the gray scale pixel to the one of the two regions

However, Pham teaches calculating a squared color difference value for each pixel pair between the overlapping strips (Refer to page 38; "This color correction technique constructs a mapping from the registered overlapping regions of two adjacent images in an image sequence. It uses multiple regression to minimize color differences. Also see right column, "Mapping Construction", paragraph 2);

Kang teaches convert the squared color difference values into a gray scale image of the overlapping strips, wherein the brightest pixels in the gray scale image correspond to the pixels of greatest difference between the two overlapping strips (Refer to paragraph [0012],[0051], also refer to Figure 1); sort the gray scale pixels from largest to smallest difference value (Refer to Figure 1, numeral 145, 146); for each sorted gray scale pixel, map the gray scale pixel to one of two regions within the overlapping strip according to the adjacency of the sort gray scale pixel to the one of the two regions (Refer to paragraph [0051], also refer to Figure 1, numeral 15, 146, 135, 136); determine a cut line between the two regions (Refer to Figure 2, numeral 250, also refer to Figure 1, numeral 145, 146); cut each

image along the cut line of the overlapping strip of each image (Refer to Figure 2, numeral 250, also refer to Figure 1, numeral 145, 146); and combine the two cut images along the cut line to form the single image (Refer to Figure 6, numeral 660, paragraph [0098]).

Peterson, Peleg, Pham and Kang are combinable because they are in the same field of image transformations specifically combining image portions. (See title and classification of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson, Peleg, Pham and Kang. All of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination of Peterson, Peleg, Pham and Kang would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

The suggestion/motivation for doing so would have been "…because the multiperspective plane sweep approach described herein is both computationally efficient, and applicable to both the case of limited overlap between the images used for creating the image mosaics, and to the case of extensive or increased image overlap." at paragraph [0051], Kang.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson with Pham and Kang to obtain all the specified claimed elements of Claim 23.

19. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson US (6,411,742 B1) in combination with Peleg (US 2003-0076406 A1) and Pham et al. "Color Correction for an Image Sequence", 1995, IEEE, pages 38-42, and further in view of Kang et al (US 20030235344 A1) and Xiong (US 5,549,651 B2).

Regarding Claim 24: (Currently Amended): Peterson in combination with Peleg, Pham and Kang in combination teach all the claimed elements as rejected above. Peterson in combination with Peleg, Pham and Kang does not expressly teach the cut line is determined by calculating mean squared difference values for pairs of pixels between the two selected image strips.

Xiong teaches the cut line is determined by calculating mean squared difference values for pairs of pixels between the two selected image strips ("Different combinations of overlapping areas are tried to achieve the optimal overlap between images (or, equivalently, the smallest error in the error function or pair wise objective function described herein) using the steps described herein, which generally minimizes the average squared pixel intensity (e.g., brightness and contrast) difference with respect to certain transformation parameters." at column 4, line 65).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to calculate the minimized line is determined by calculating mean squared difference values for pairs of pixels between the two selected overlapping image strips.

Peterson, Peleg, Pham, Kang and Xiong are combinable because they are in the same field of creating high quality virtual panoramas. (See abstract Xiong).

The suggestion/motivation for doing so would have been to “yield dramatic improvements during the mathematical, authorization processes and projection cycles with speeds up to several order of magnitude faster than any prior system.” (Abstract, Xiong).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the claimed elements of Peterson, Peleg, Pham, Kang and Xiong to obtain the specified claimed elements of Claim 24.

Regarding Claim 25 (Original) Xiong teaches wherein at least one of the images is warped where the differences between the selected strips along the cut line exceed a predetermined threshold (Where the images overlap there is potential for misalignment when constructing a 3D panorama, as indicated by blurry lines 112, for a variety of reasons, ... distortions that occur when warping a 2D image to construct a 3D image space. The present invention is designed to calibrate and align all such 2D rectilinear images with respect to one another and globally, blend the images where they overlap, and construct a reconstructed and relatively error free 3D panorama image, shown conceptually in 2D form as FIG. 1(b), for any arbitrary geometry.” at column 3, line 41).

20. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Peterson US (6,411,742 B1) in combination with Peleg (US 2003-0076406 A1) and Pham et al. “Color Correction for an Image Sequence”, pages 38-42.

Regarding Claim 26: (Currently Amended) Peterson teaches system for blending images into a single image (Refer to Figure 1, numeral 10), means for determining a cut line through the two

images where the difference values are minimized (Refer to column 5, line 17+; also refer to Figure 3c, 3c-1 by way of numeral 54); and means for blending the two images along the cut line to create a blended single image (Refer to column 1, line 51).

Peleg teaches: means for dividing two images having overlapping content into strip along a common plane in at least one region of overlap wherein each strip is a long and narrow piece of the image having one dimension which is greater than another dimension of the respective strip (Refer to Figure 6, numerals 601-604);

Pham teaches means for calculating difference values between the image data content of respective_pixels of the two images in corresponding strips of uniform length in the at least one region of overlap (Refer to page 38, Section "Mapping Construction"; "We wish to find a mapping that will convert the color value of each of the pixels in A' to the corresponding pixel color value in B'.")

Peterson, Peleg and Pham are combinable because they are in the same field of merging images into panoramic images.

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to calculate difference values between the image data content of respective pixels of the two images in corresponding strips of uniform length in the at least one region of overlap.

The suggestion/motivation for doing so would be that to create an environment that eases "multiple regression steps to find the relationship between the registered overlapping regions of two adjacent images in a sequence." see page 38, right column, paragraph 2, Pham.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Peterson, Peleg and Pham to obtain the specified claimed elements of Claim 26.

21. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al (US 20030235344 A1).

Regarding Claim 27: (Currently Amended) Kang teaches a system for blending images into a single image ("A system and method for deghosting mosaics provides a novel multiperspective plane sweep approach for generating an image mosaic from a sequence of still images, video images, scanned photographic images, computer generated images, etc." at abstract), comprising:

a first computing module dividing two images having overlapping content into strips along a common plane in at least one region of overlap (Refer to Figure 1, numeral 145, 146, also refer to Figure 2, numeral 200; "This multiperspective plane sweep approach uses virtual camera positions to compute depth maps for strips of overlapping pixels in adjacent images. These strips, which are at least one pixel in width, are perpendicular to camera motion." at paragraph [0011]);

a second computing module calculating difference values between [[the]] pixels of the two images in the at least one region of overlap (Refer to Figure 1, numeral 145, 146, also refer to Figure 2, numeral 200; also Refer to paragraph [0058], also Figure 2, numeral 230),

wherein the difference values individually correspond to a difference of image data content between a pair of corresponding pixels of the two images; (Refer to paragraph [0057]);

a third computing module determining a cut line through the two images where the difference values are minimized; (Refer to Figure 1, numeral 145, 146, also Figure 2, numeral 230);

a fourth computing module blending the two images along the cut line to create a blended single image. (Refer to Figure 1, numeral 145, 146; paragraph [0080], also Figure 5).

Kang does not specifically/expressly disclose the claimed elements of the system with the equivalent subject matter as claimed in Claim 27. However, Kang does teach the computing modules that support the system claimed limitations of Claim 27.

All of the claimed method steps have been rejected by one of the claimed combination as rejected above. Claim 27 stands rejected based upon the functionality of the system of Claim 27 as taught and fully supported by the disclosure of Kang. Claims 1 and 21 equally resemble the claimed subject matter of Claim 27, therefore, claim 27 is also rejected for those reasons as stated above.

22. Claim 28-31, 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kang et al (US 20030235344 A1) in combination with Peterson US (6,411,742 B1).

Regarding Claim 28 (Original)**:** Kang teaches all the claimed element as rejected above. Kang does not specifically teach a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized.

Peterson teaches a system (Refer to Figure 1, numeral 10) selecting two overlapping strips according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized. (Performed by the portion of Figure 1, numeral 50) "If the outlines of the aligned images intersect at more than two points, the dividing-line determiner 54 selects the two intersection points that are furthest apart from each other to define the dividing line 80." at column 5, line 32).

Kang and Peterson are combinable because they are in the same field of image transformations, specifically, combining image portions. (See abstract and classification of each invention).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to select two overlapping strips according to a mean squared difference algorithm such that the sum of the mean squared difference values between the two strips is minimized.

The motivation/suggestion for doing so would have been "to save processing time without altering the images and masking out portions of an image." at column 1, line 50+, Peterson.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings/disclosures of Kang in combination with Peterson to obtain the specified claimed elements of Claim 28.

Regarding Claim 29: (Original) Peterson teaches the system (Refer to Figure 1, numeral 10) including: a fifth computing module cutting the two images along the cut line (Performed by the portion of Figure 1, numeral 54); and a sixth computing module joining the cut images together to create the single image (Performed by the portion of Figure 1, numeral 58; "Determining the position of the segment depicted in the second image relative to the segment in the first allows the method to blend images that may represent segments of the view that are arbitrarily positioned relative to each other. It also allows the method to blend images that may have arbitrary shapes and sizes." at column 1, line 51).

Regarding Claim 30: (Original) Peterson teaches the system (Refer to Figure 1, numeral 10) at least one of the cut images is warped along the cut line to improve the fit between the two images along the cut line (Performed by Figure 1, numeral 56; "Refer to Figure 2b; "Thus, the image stitching software 14 allows a user to blend multiple images 18a-18d to create a panoramic image 26 with a field of view that is larger than the field of any one of the multiple images." at column 3, line 52).

Regarding Claim 31: (Original) Peterson teaches the system (Refer to Figure 1, numeral 10) the blending of images is performed iteratively, with the blended single image being utilized as one of the two images to be blended ("The stitching software 14 checks (222) whether there are any more images between the reference image 18a and the current image 18b'. If there are

more images, the stitching software 14 sets (224) the reference image to be the next image after the current reference image and repeats the process of setting a section of the current image 18b' invisible 208-220 described above." at column 5, line 46).

Regarding Claim 41: (Previously Presented) Peterson teaches the pairs of the pixels individually correspond to the same subject present in the two images ("Referring again to FIG. 1, the positioning module 50 of the image stitching software 14 determines the relative positions of the segments depicted in two of the images 18a-18d so that an image of an object depicted in one of the images can be aligned with another image of the same object." at column 3, line 59).

23. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mai et al. (US 20040057633 A1) in combination with Kang et al (US 20030235344 A1) and further in view of Takiguchi et al.(US 7085435 B2).

Regarding Claim 16: (Previously Presented) Mai teaches a method for blending images into a single image (Refer to abstract; "The present invention provides a system for mosaicing multiple input images, captured by one or more remote sensors, into a seamless mosaic of an area of interest. Each set of input images captured by the remote sensors within a capture interval are ortho-rectified and mosaiced together into a composite image. Successive composite images, along a given flight path, are then mosaiced together to form a strip. Adjacent strips are then mosaiced together to form a final image of the area of interest." at abstract); comprising:

selecting a strip in each image where the two images overlap ("More specifically, the present invention provides a system for mosaicing two overlapping digital input images together. One

input image, comprising a number of pixels having certain intensity, is identified as the reference image. A second input image, also comprising a number of pixels having certain intensity, overlaps the reference image in an overlap area." at paragraph [0008]);

determining a line through the selected overlapping strips where differences between the selected overlapping strips are minimized(Refer to paragraph [0012]; specifically, "In addition, the present invention also provides a method of establishing a seam line between adjacent image strips that minimizes perspective imaging effects of elevated features in the image strips. An initial seam line between the image strips is selected.");

blending the two images along the determined minimized line to create a single image ("The present invention provides a versatile system for efficiently and reliably stitching together images, collected from high-resolution digital imaging sensors, into a seamless, high quality, wide FOV mosaic image." at paragraph [0007]; "The initial seam line is divided into small segments. The position of an elevated feature in a particular segment is determined; and the route of the seam line in that segment is then altered based on the position of the elevated feature." at paragraph [0012]; "a versatile system for efficiently and reliably stitching together images, collected from high-resolution digital imaging sensors, into a seamless, high quality, mosaic image covering a wide FOV. The mosaicing processes of the present invention efficiently stitch (or mosaic) thousands of small, digital sub-images into a single, high-quality composite image." at paragraph [0029]);

Kang teaches dividing two images into strips along a common plane ("This multiperspective plane sweep approach uses virtual camera positions to compute depth maps for strips of

overlapping pixels in adjacent images. These strips, which are at least one pixel in width, are perpendicular to camera motion." at paragraph [0011]);

warping the single image to minimize blurring along the blending line ("In either case, perspective warping of an image simply means to digitally process the image so that it appears that the image was captured or rendered from the perspective of a different camera location or point of view, rather than at the position or point of view from which the image was either originally captured or rendered. For example, with respect to the MPPS techniques described herein, perspective warping of images is used to warp overlapping images so that each image appears to be in the same plane." at paragraph [0015]);

Takiguchi teaches selecting the overlapping strips which have reduced error between the selected overlapping strips compared with non-selected overlapping strips of the two images (Refer to Figure 5, numeral 504, 517; " The panoramic image synthesization unit 517 serves as determination means for determining whether or not an image in an overlapping image area consists mainly of characters, and also serves as image synthesization means for synthesizing images after different image processing is performed in consonance with a result obtained by the determination means." at column 11, line 62).

At the time that the invention was made, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Takiguchi.

All of the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective

functions, and the combination of Mai, Kang and Takiguchi would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

The suggestion/motivation for combining the teachings of Mai and Kang would have been "...because the multiperspective plane sweep approach described herein is both computationally efficient, and applicable to both the case of limited overlap between the images used for creating the image mosaics, and to the case of extensive or increased image overlap." at paragraph [0051], Kang.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Mai, Kang and Takiguchi to obtain the specified claimed elements of Claim 16.

Response to Arguments

Applicant hereby add new claims 42-43 which are supported at least by Figures 4-6 and the associated teachings of the specification.

Summary of Remarks:

A. At page 12, "there is no teaching that the alignment error of Col. 9 for the alignment process related in any way to the selected regions. Further at page 13, claims which depend from independent claim 1 are in condition for allowance for the reasons discussed above with respect to independent claim 1.

Examiner’s Response:

B. Applicant's arguments with respect to claim 1 and the claim which depend from independent claim1, at pages 12-13 have been considered but are moot in view of the new ground(s) of rejection.

Summary of Remarks:

C. At page 13, Applicants respectfully submit that positively-recited limitations of claim 16 are not disclosed nor suggested by the prior art and the 103 rejection of claim 16 is in error for at least this reason.

Examiner’s Response:

D. The Examiner respectfully disagrees. The Examiner has forwarded an alternative rejection to support the limitation such that “selecting the overlapping strips which have reduced error between the selected overlapping strips compared with non-selected overlapping strips of the two images” as taught by Takiguchi. (See rejection above)

However, “Image Stitching Software 14” has user software such that the modules contained therein can more than adequately “select overlapping strips where the difference between those strips are minimized and calculated to be processed by the “Image Blender 58”) Overall, Peterson teaches “a method that relates to merging images to form a panoramic image.” Therefore, the rejection of Claim 16 stands.

Summary of Remarks:

E. At page 13 and 14, "Applicants respectfully submit that positively-recited limitations of claim 21 are not disclosed nor suggested by the prior art and the 103 rejection of claim 21 is in error for at least this reason." Similarly with respect to claim 26, at page 14, "Applicants respectfully submit that positively-recited limitations of claim 26 are not disclosed nor suggested by the prior art and the 103 rejection of claim 26 is in error for at least this reason." Also at page 14 and 15, "Applicants respectfully submit that numerous positively-recited limitations of claim 27 are not disclosed nor suggested by the prior art and the 103 rejection is in error."

Examiner's Response:

F. The Examiner respectfully disagrees. Applicant's arguments with respect to claim 21 and 26 and the dependent claims from which depend from Claim 21 have been considered but are moot in view of the new ground(s) of rejection.

Peterson teaches "Image Stitching Software 14" has user software such that the modules contained therein can more than adequately "select overlapping strips where the difference between those strips are minimized and calculated to be processed by the "Image Blender 58") Overall, Peterson teaches "a method that relates to merging images to form a panoramic image." Therefore, the rejection of Claim 21 and 26 stands.

With regards to Claim 27, Kang teaches the system/device which disclose the claimed elements of the system with the equivalent subject matter as claimed in Claim 1. Kang does teach the computing modules that support the system claimed limitations of Claim 27. Claim 27 embodies

a method claim that equally resembles the system claim of claim 27, therefore, the rejection of claim 27 stands.

Summary of Remarks:

G. At page 15, referring to independent claim 33, Applicants respectfully submit the teachings of col. 9 of Herman are used for adjusting alignment of the images of step 103 prior to the selection of regions of step 104 which fails to teach the claimed limitations of determining the differences between the overlapping two strips."

Examiner's Response:

H. Applicant's arguments with respect to claim 33 and the claim which depend from independent claim 33 at pages 15-16 have been considered but are moot in view of the new ground(s) of rejection.

Summary of Remarks:

I. At page 16, "Applicants note that no specific rejection has been presented against claim 41. In particular, claim 41 is recited on page 30 of the Office Action under paragraph 16 pertaining to 103 rejections under the sole Kang reference but the Office fails to identify any teachings of Kang and instead recites teachings of Peterson. The Action is void of identifying which combination of references including Peterson is considered to obviate claim 41. Applicants respectfully request issuance of a non-final Action if claim 41 is not allowed so Applicants may properly respond during the prosecution of this application."

Examiner's Response:

J. The Examiner has forwarded a newly issued Office Action to correct the error by the Examiner which erroneously placed claim 41 under the incorrect sub-heading. A newly combined teaching of the claimed recitations is forwarded herewith.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mia M. Thomas whose telephone number is (571)270-1583. The examiner can normally be reached on Monday-Thursday 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on 571-272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mia M Thomas/
Examiner, Art Unit 2624

/Vikkram Bali/

Supervisory Patent Examiner, Art Unit 2624